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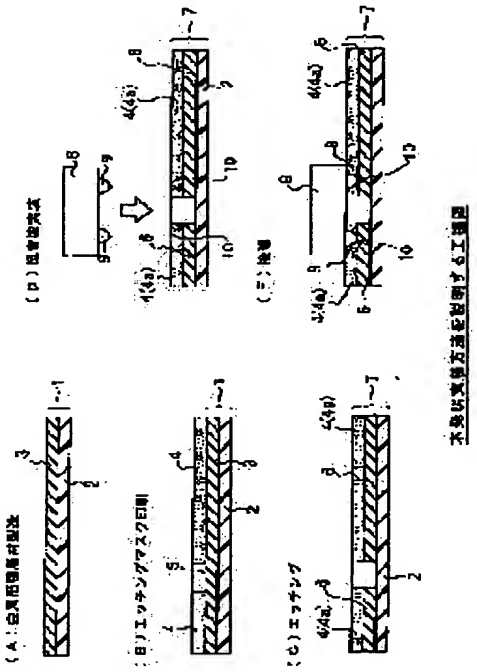
(54) METHOD OF MOUNTING SEMICONDUCTOR CHIP AND METHOD OF MANUFACTURING ELECTROMAGNETIC WAVE READABLE DATA CARRIER

(57)Abstract:
PROBLEM TO BE SOLVED: To quickly and electrically and mechanically reliably provide a method of mounting a semiconductor chip on a wiring board at a low cost, in a mountable flip-chip connection system.
SOLUTION: This mounting method comprises a step of pressing bumps of a semiconductor bare chip onto a thermoplastic resin film which is in a molten state in the condition of heating the thermoplastic resin film covering electrode regions on a wiring pattern with application of ultrasonic waves, thereby pushing the molten thermoplastic resin film aside to cause the bumps to contact the electrode regions, a step of successively applying ultrasonic waves to ultrasonically bond the bumps to the electrode regions in the condition of the bumps contacted to the electrode regions, and a step of cooling and hardening the molten thermoplastic resin to adhere the semiconductor bare chip to the wiring board.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The state to which heating melting of the wrap thermoplastics coat was carried out for the electrode field on a circuit pattern characterized by providing the following The process at which the thermoplastics coat which fused the bump of a semiconductor bare chip by pushing giving an ultrasonic wave on the thermoplastics coat in the melting state is pushed away, and a bump and an electrode field are contacted The process to which ultrasonic jointing of a bump and the electrode field is carried out by giving an ultrasonic wave continuously in the state where the aforementioned bump and the electrode field contacted, and the process which carries out cooling solidification of the thermoplastics which carried out [aforementioned] fusion, and pastes up the main part of a semiconductor bare chip on a wiring substrate
[Claim 2] The wiring substrate for flip chip bonding which the front face of a circuit pattern continues all over the, and is covered by the thermoplastics coat.
[Claim 3] The manufacture method of the wiring substrate for flip chip bonding which uses thermoplastics as etching mask material used in case a circuit pattern is formed by etching processing.
[Claim 4] The data carrier main part which makes it come to hold the spiral conductor pattern which constitutes an antenna coil in the insulating base of the shape of the shape of a film characterized by providing the following, the shape of a sheet, and sheet metal, the shape of film, shape of sheet, and circuit pattern top of a sheet metal-like wiring substrate -- a transceiver circuit -- making a note -- etc. -- the manufacture method of the data carrier which comes to unify the electronic-parts module which comes to mount the semiconductor bare chip to constitute and in which electromagnetic wave reading is possible -- it is -- the shape of the shape of an aforementioned film, and a sheet -- Or the process which manufactures the electronic-parts module which comes to mount a semiconductor bare chip on the circuit pattern of a sheet metal-like wiring substrate is the state to which heating melting of the wrap thermoplastics coat was carried out for the electrode field on the aforementioned circuit pattern. The process at which the thermoplastics coat which fused the bump of a semiconductor bare chip by pushing giving an ultrasonic wave on the thermoplastics coat in the melting state is pushed away, and a bump and an electrode field are contacted The process to which ultrasonic jointing of a bump and the electrode field is carried out by giving an ultrasonic wave continuously in the state where the aforementioned bump and the electrode field contacted, and the process which carries out cooling solidification of the thermoplastics which carried out [aforementioned] fusion, and pastes up the main part of a semiconductor bare chip on a wiring substrate
[Claim 5] The wiring substrate which the front face of a circuit pattern continues all over the, and is covered by the thermoplastics coat and which is used for the manufacturing process of an electronic-parts module according to claim 4.
[Claim 6] The manufacture method of the wiring substrate according to claim 5 which uses thermoplastics as etching mask material used in case a circuit pattern is formed by etching processing.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the mounting method of the suitable semiconductor chip for manufacture of the data carrier which functions as an aeronautical-navigation tag, the label for physical distribution managements, a path for an uninhabited ticket gate, etc. and in which electromagnetic wave reading is possible etc., and relates to the mounting method of the semiconductor chip which enabled mounting of a semiconductor bare chip in a low cost by the flip-chip-bonding method on the wiring substrate especially.
[0002]
[Description of the Prior Art] As a data carrier which can electromagnetic wave read this kind, the aeronautical-navigation tag indicated by JP,6-243358,A is known, for example. It is predicted that this aeronautical-navigation tag will be used for management of the customer load in an airport etc. by the disposable method in the near future, and, in the case of the airline of a global scale, the huge need which at least one company said as 8,500,000 monthly outputs is expected in that case. Therefore, it is related with this kind of aeronautical-navigation tag, and is overly low cost mass.
[0003] The aeronautical-navigation tag indicated by this official report carries IC parts used as the spiral conductor pattern used as an antenna coil, a transceiver circuit, memory, etc. in one side of the base made from a PET film which has the shape of a rectangle, and is constituted.
[0004] The main part of an aeronautical-navigation tag holding the spiral conductor pattern used as an antenna coil can form the copper foil put on one side of a PET film, and aluminum foil by carrying out a selective corrosion by etching processing. Therefore, the mass-production line by RTR (Roll ToRoll) is easily realizable with the resist formation process by well-known photolithography, the wet etching process following it, etc. The passive circuit elements which, on the other hand, serve as a transceiver circuit which should be carried in the main part of an aeronautical-navigation tag, memory, etc. are formed into 1 chip using semiconductor accumulation technology.
[0005] These people are performing a modularization by mounting beforehand previously the semiconductor bare chip which constitutes an above-mentioned transceiver circuit, above-mentioned memory, etc. in an insulating film-like wafer (a kind of wiring substrate), and pasting up this electronic-parts module on the PET film which constitutes the main part of an aeronautical-navigation tag, and have proposed raising the productivity of an aeronautical-navigation tag.
[0006] By the way, in the electronic-parts loading sheet of which advanced thin shape-ization is required, the proposal about the flip-chip-bonding method which mounts the semiconductor chip of raise in basic wages directly on a wiring substrate is briskly made like the above-mentioned electronic-parts module adhered to an aeronautical-navigation tag.
[0007] An example (henceforth the 1st conventional method) of a flip-chip-bonding method is shown in drawing 14 . If it is in this 1st conventional method, after forming the letter terminal b of a salient for connection (henceforth a bump) in the base electrode (not shown) of

semiconductor chip a beforehand and carrying out alignment of the electrode field d of the circuit pattern on the wiring substrate c to this bump b, it is made to connect between both by the jointing material e, such as a pewter and a conductive paste.
[0008] If it is in this 1st conventional method, in order to obtain the humidity-tolerant reliability for that processes, such as supply of the jointing material e for connecting the electrode field d of a circuit pattern with the (1) bump b and hardening, are complicated, and (2) bump connection, and the loading intensity of a semiconductor, It needs to be filled up with the insulating resin f called under-filling between Chip a and Substrate c, and it is necessary to close a part for a bump connection, (3) The problem referred to as that a manufacturing cost benefits it high that the process which carries out restoration hardening of the insulating resin f used as under-filling is needed etc. is pointed out.
[0009] Other examples (henceforth the 2nd conventional method) of a flip-chip-bonding method are shown in drawing 15 . This 2nd conventional method solves the trouble of the 1st conventional method, and mounts a semiconductor bare chip on a wiring substrate using a different direction electric conduction sheet which is proposed in the patent No. 2,586,154 official report.
[0010] If it is in this 2nd conventional method, the different direction electric conduction sheet g which distributed the conductive particle is made to intervene between the semiconductor bare chip a and the wiring substrate c in thermoplasticity or a thermosetting resin, and a resin is made to flow by thermocompression bonding and it is made to obtain the electrical installation of the thickness direction by the conductive particle h inserted between Bump b and the electrode field d of a circuit pattern.
[0011] Alignment with the circuit pattern at the time of mounting a semiconductor on a wiring substrate can carry out upwards comparatively rough, and the resin setting time is as short as 10 - 20 seconds, it is not necessary to use sealing agents, such as under-filling, and there is an effect referred to as being able to aim at low manufacturing-cost-ization by this method. that (1) different direction electric conduction sheet g is comparatively expensive on the other hand and (2) -- the high temperature of 200 degrees C or more in the hardening -- eye a required hatchet -- that it cannot use for a substrate without thermal resistance, and (3) -- although it is a short time comparatively, hardening of resin material takes 10 - 20 seconds, and simplification of the further process and improvement in the speed are difficult -- (4) In order for contact of the electric conduction particle distributed in resin material to perform electrical installation between a bump and a substrate pattern, problems, such as a scarce thing, are pointed out to the reliability of connection still more.
[0012]
[Problem(s) to be Solved by the Invention] this invention has the place which it is made paying attention to the above-mentioned trouble in the conventional flip-chip-bonding method, and is made into the purpose in offering quickly the mounting method of the semiconductor chip according a semiconductor chip also electrically and mechanically to the flip-chip-bonding method which can be mounted in a low cost certain further on a wiring substrate.
[0013] Moreover, the place made into other purposes of this invention is to offer the suitable wiring substrate for flip chip bonding for the above-mentioned mounting method.
[0014] Moreover, the place made into other purposes of this invention is about the above-mentioned wiring substrate to offer the manufacture method of the wiring substrate for flip chip bonding which can be manufactured [easy and] to a low cost.
[0015] Furthermore, the place made into other purposes of this invention is to offer the manufacture method of the data carrier in which electromagnetic wave reading which can mass-produce the data carrier which functions as an aeronautical-navigation tag, the label for physical distribution managements, a path for an uninhabited ticket gate, etc., and in which electromagnetic wave reading is possible to a low cost is possible.
[0016] About the purpose and effect of further others of this invention, by referring to the publication of the gestalt of operation etc., if it is this contractor, I will be understood easily.
[0017]
[Means for Solving the Problem] In the state where the mounting method of the semiconductor

chip this invention carried out heating melting of the wrap thermoplastics coat for the electrode field on a circuit pattern By pushing giving an ultrasonic wave, the bump of a semiconductor bare chip on the thermoplastics coat in the melting state In the state where the process at which the fused thermoplastics coat is pushed away and a bump and an electrode field are contacted, and the aforementioned bump and an electrode field contacted By giving an ultrasonic wave continuously, the process to which ultrasonic jointing of a bump and the electrode field is carried out, and the process which carries out cooling solidification of the thermoplastics which carried out [aforementioned] fusion, and pastes up the main part of a semiconductor bare chip on a wiring substrate are provided.

[0018] Here, in the state where heating melting of the wrap thermoplastics coat was carried out for the "circuit pattern up electrode field, the coat of thermoplastics is beforehand formed in the electrode field on the circuit pattern of the wiring substrate used by this invention so that clearly from " and a certain thing. This coat may be a wrap thing only about the electrode field of a circuit pattern, and may be a wrap thing about the whole surface on the front face of a circuit pattern.

[0019] Moreover, "the electrode field on a circuit pattern" means the fixed small field on the circuit pattern containing the predetermined position to which the terminal of electronic parts etc. is connected here. Probably, in this electrode field, the portion on a circuit pattern generally called a land etc. is contained.

[0020] Moreover, that it is with "heating melting" means the concept including the both sides in the state where it has softened to the state where a thermoplastics coat is heated and it is fusing, and the grade currently heated. Furthermore, as for the "thermoplastics" said here, it is desirable that it is what has a good property as adhesives.

[0021] And since junction to (1) bump and an electrode field is the diffused junction by the ultrasonic wave according to such composition, Since the resin seal of that a positive electric flow can be aimed at and the (2) joints is carried out, In case moisture resistance's becoming good, and (3) semiconductor chips and a wiring substrate are hardening of thermoplastics, in order to paste up, (4) electric flow and mechanical combination can be made [that the mechanical mounting intensity to hauling etc. is high,] simultaneously in a short time, (5) Since a thermoplastics coat does not exist about the portion which special closure or a special adhesion process, and the charge of a binder having a low unnecessary hatchet manufacturing cost and (6) substrate front face have exposed, the operation effects, like there is no substrate front face at the time of heating, and there is no poor ****** more than required are acquired.

[0022] Moreover, the front face of a circuit pattern continues all over the, and the wiring substrate for flip chip bonding of this invention is covered by the thermoplastics coat.

[0023] Since according to such composition the front face of a circuit pattern continues all over the and is being worn by the thermoplastics coat when it is used for the above-mentioned mounting method, damp-proof good closure structure and a bonded structure with high tensile strength are obtained.

[0024] Moreover, the manufacture method of the wiring substrate for flip chip bonding this invention uses thermoplastics as etching mask material used in case a circuit pattern is formed by etching processing.

[0025] Since the etching mask material used for the etching processing for formation of a circuit pattern serves as a wrap thermoplastics coat in the whole surface on the front face of a conductor pattern as it is according to such composition, separately, a coat formation process is unnecessary, and time and effort is not taken, but it can manufacture to a low cost.

[0026] moreover, the circuit pattern top of the data carrier main part which makes it come to hold the spiral conductor pattern from which the manufacture method of a data carrier which this invention can electromagnetic wave read constitutes an antenna coil in the insulating base of the shape of the shape of a film, the shape of a sheet, and sheet metal, and a the shape of a film, the shape of a sheet and a sheet-metal-like wiring substrate -- a transceiver circuit -- making a note -- etc. etc. -- it is the manufacture method of the data carrier which comes to unify

[0027] In the manufacture method of this data carrier, a main characteristic matter is in the

process which manufactures the electronic-parts module which comes to mount a semiconductor bare chip on the shape of an aforementioned film, the shape of a sheet, and the circuit pattern of a sheet metal-like wiring substrate.
[0028] namely, at the process which manufactures this electronic-parts module In the state where heating melting of the wrap thermoplastics coat was carried out for the electrode field on the aforementioned circuit pattern By pushing giving an ultrasonic wave, the bump of a semiconductor bare chip on the thermoplastics coat in the melting state In the state where the process at which the fused thermoplastics coat is pushed away and a bump and an electrode field are contacted, and the aforementioned bump and an electrode field contacted The process to which ultrasonic jointing of a bump and the electrode field is carried out by giving an ultrasonic wave continuously, the process which carries out cooling solidification of the thermoplastics which carried out [aforementioned] fusion, and pastes up the main part of a semiconductor bare chip on a wiring substrate, and **** dark-circles ****.
[0029] And since junction to (1) bump and the electrode field which were mentioned above is the diffused junction by the ultrasonic wave according to such composition, Since the resin seal of that a positive electric flow can be aimed at and the (2) joints is carried out, In case moisture resistance's becoming good, and (3) semiconductor chips and a wiring substrate are hardening of thermoplastics, in order to paste up, (4) electric flow and mechanical combination can be made [that the mechanical mounting intensity to hauling etc. is high,] simultaneously in a short time, (5) Special closure, an adhesion process, or material has a low unnecessary hatchet manufacturing cost, (6) Since a thermoplastics coat does not exist about the portion which the substrate front face has exposed, poor ****** does not have a substrate front face more than required at the time of heating, It becomes possible to mass-produce the data carrier which functions as an aeronautical-navigation tag, the label for physical distribution managements, a path for an uninhabited ticket gate, etc. and in which electromagnetic wave reading is possible to a low cost through the operation effect of **.
[0030] Moreover, the front face of a circuit pattern continues all over the, and the wiring substrate used for the manufacturing process of the electronic-parts module of this invention is covered by the thermoplastics coat.
[0031] Since the front face of a circuit pattern continues all over the and is being worn by the thermoplastics coat when it is used for the process which manufactures an above-mentioned electronic-parts module according to such composition, damp-proof good closure structure and a bonded structure with high tensile strength are obtained.
[0032] Moreover, the manufacture method of the wiring substrate this invention uses thermoplastics as etching mask material used in case a circuit pattern is formed by etching processing.
[0033] Since the etching mask material used for the etching processing for formation of a circuit pattern serves as a wrap thermoplastics coat in the whole surface on the front face of a conductor pattern as it is according to such composition, separately, a coat formation process is unnecessary, and time and effort is not taken, but it can manufacture to a low cost.
[0034] moreover, the data carrier main part which makes it come to hold the metallic foil pattern with which the manufacture method of a data carrier which this invention can electromagnetic wave read constitutes an antenna coil in the base made of a film-like resin and the aluminum foil circuit pattern of the base front face made of a film-like resin -- a transceiver circuit -- making a note -- etc. -- it is the manufacture method of the data carrier which is constituted by unifying the electronic-parts module which comes to mount the semiconductor bare chip to constitute and in which electromagnetic wave reading is possible
[0035] In the manufacture method of the data carrier in which this electromagnetic wave reading is possible, a main characteristic matter is in the process which manufactures the electronic-parts module which comes to mount a semiconductor bare chip on the aluminum foil circuit pattern of the aforementioned base front face made of a film-like resin.
[0036] namely, at the process which manufactures this electronic-parts module In the state where heating melting of the wrap thermoplastics coat was carried out for the electrode field on the aforementioned aluminum foil circuit pattern By pushing giving an ultrasonic wave, the bump

of a semiconductor bare chip on the thermoplastics coat in the melting state In the state where the process at which the fused thermoplastics coat is pushed away and a bump and an electrode field are contacted, and the aforementioned bump and an electrode field contacted By giving an ultrasonic wave continuously, the process to which ultrasonic jointing of a bump and the electrode field is carried out, the process which carries out cooling solidification of the thermoplastics which carried out [aforementioned] fusion, and pastes up the main part of a semiconductor bare chip on a wiring substrate, and ** are contained.
[0037] Moreover, the front face of an aluminum foil circuit pattern continues all over the, and the wiring substrate of this invention is covered by the thermoplastics coat.
[0038] Moreover, the manufacture method of the wiring substrate this invention uses thermoplastics as etching mask material used in case an aluminum foil circuit pattern is formed by etching processing.
[0039] With the gestalt of desirable operation of this invention, a polyolefine system resin or a polyester system resin is used as thermoplastics.
[0040] By using such a resin, the operation effect referred to as that the good bonding strength between the good chemical resistance as an etching mask and metal Bengbu by the side of a semiconductor chip, and the metal-electrode field by the side of a circuit pattern is obtained is expected. namely, a polyolefine system resin -- alkaline etching reagents, such as NaOH, -- moreover, a polyester system resin -- FeCl2 etc. -- good resistance is presented to an acid etching reagent And those resins are excellent also in an adhesive property.
[0041]
[Embodiments of the Invention] Below, one gestalt of suitable implementation of the mounting method of the semiconductor chip concerning this invention is explained in detail according to an accompanying drawing.
[0042] As stated previously, the mounting method of the semiconductor chip of this invention In the state where heating melting of the wrap thermoplastics coat was carried out for the electrode field on a circuit pattern By pushing giving an ultrasonic wave, the bump of a semiconductor bare chip on the thermoplastics coat in the melting state In the state where the process at which the fused thermoplastics coat is pushed away and a bump and an electrode field are contacted, and the aforementioned bump and an electrode field contacted By giving an ultrasonic wave continuously, the process to which ultrasonic jointing of a bump and the electrode field is carried out, and the process which carries out cooling solidification of the thermoplastics which carried out [aforementioned] fusion, and pastes up the main part of a semiconductor bare chip on a wiring substrate are provided.
[0043] The outline of a series of processes including this mounting method is shown in process drawing of drawing 1 . The etching process (C), ultrasonic mounting process (D), and adhesion process (E) for a metallic foil plywood manufacturing process (A), etching mask presswork (B), and circuit pattern formation are included in this process of a series of. Hereafter, the detail of those processes is explained in order.
[0044] [Metallic foil plywood manufacturing process (A)] At this process, the aluminum-PET plywood 1 which makes the field material of a film-like wiring substrate is manufactured. This aluminum-PET plywood 1 puts the hard aluminum foil 3 of 35-micrometer ** on one side (drawing upper surface) of the PET film 2 of 25-micrometer ** through urethane system adhesives, and is manufactured through the process which carries out laminating adhesion of this through a heat lamination on condition that 2 150 degrees C and the pressure of 5kg/cm.
[0045] [Etching mask presswork (B)] At this process, the etching-resist pattern 4 of a necessary circuit pattern configuration is formed in the front face of the hard aluminum foil 3 of the aluminum-PET plywood 1. Formation of this resist pattern 4 is performed by applying to the front face of the hard aluminum foil 3 the adhesives made of thermoplastics of a polyolefine system fused at the temperature of about 150 degrees C about 4-6 micrometers in thickness by methods, such as gravure. As for this coating thickness, it is desirable to adjust according to the bump size or the configuration of the bare chip carried.
[0046] [Etching process (C)] At this process, the circuit pattern 6 which consists of hard aluminum foil 3 is formed by removing conventionally the aluminum foil portion 5 exposed from

the etching-resist pattern 4 by well-known etching processing. Formation of this circuit pattern 6 is performed by exposing the aluminum foil portion 5 exposed from the etching-resist pattern 4 on conditions with a temperature of 50 degrees C to NaOH (120 g/l) which is an etching reagent. In the front face of the wiring substrate 7 obtained at this etching process, the circuit pattern 6 which consists of hard aluminum foil 3 appears. Moreover, the front face of this circuit pattern 6 is being worn by the adhesives made of thermoplastics of the polyolefine system which continued all over the and was used as an etching-resist pattern (etching mask) 4. If it puts in another way, even if there are few these circuit patterns 6, the front face of an electrode field (connection schedule field with the bump of the semiconductor bare chip mentioned later) is being worn by thermoplastics coat 4a.

[0047] [Ultrasonic mounting process (D)] At this process, the semiconductor bare chip 8 is mounted on the wiring substrate 7, giving an ultrasonic wave. In the state where this process carried out heating melting of the wrap thermoplastics coat 4a for the electrode field 10 on a circuit pattern 6 By pushing giving an ultrasonic wave, the bump 9 of the semiconductor bare chip 8 on thermoplastics coat 4a in the melting state In the state where the process (the 1st process) at which fused thermoplastics coat 4a is pushed away and a bump 9 and the electrode field 10 are contacted, and a bump 9 and the electrode field 10 contacted By giving an ultrasonic wave continuously, the process (the 2nd process) to which ultrasonic jointing of a bump 9 and the electrode field 10 is carried out is included.

[0048] That is, the semiconductor bare chip 8 is 150 micrometers in thickness, and consists of the base as the so-called surface mount die parts which made the bump 9 who is a metal terminal for connection project. At the 1st process, this bump (for example, it consists of gold) 9 is in the state which added supersonic oscillation, and is pressed against thermoplastics coat 4a fused by 150-degree C heating. Then, it is pushed away by fused thermoplastics coat 4a from a bump's 9 nose-of-cam position by a bump's 9 supersonic oscillation, it is removed, and the oxide layer on aluminum foil circuit pattern 6 front face etc. is further removed mechanically by vibration. Consequently, a bump 9 and the electrode field 10 are contacted. At the 2nd process, after that, a bump 9 and the electrode field 10 of a circuit pattern 6 are further heated with the frictional heat by vibration, the metal weld section which the golden atom diffused in aluminum foil is formed, and both ultrasonic jointing is completed.

[0049] After the 1st of a more than and the 2nd process arrange the semiconductor bare chip 8 in a predetermined position, they are completed under 0.2kg [/mm] load-pressure 2 by adding supersonic oscillation with a vibration frequency of 63kHz about several seconds.

[0050] The detail is shown in process drawing of drawing 2 from this ultrasonic mounting process's. As shown in the ultrasonic horn 11 at arrow 11a, adsorption maintenance of the bare chip 8 is carried out, and heater table combination Annville 12 is made to carry out adsorption maintenance of the wiring substrate 7 at the positioning process shown in this drawing (a), in the state where opposite arrangement of the ultrasonic horn 11 and heater table combination Annville 12 which have a vacuum adsorption function, respectively was carried out up and down, as shown in arrow 12a. In this state, making the ultrasonic horn 11 and heater table combination Annville 12 horizontally displaced relatively, positioning with the bump 9 by the side of a bare chip 8 and the electrode field 10 of the circuit pattern 6 by the side of the wiring substrate 7 is performed, and the wiring substrate 7 is simultaneously heated to 150 degreeC by heater table combination Annville 12.

[0051] At the removal process of a thermoplastic resin adhesive shown in this drawing (b) By the ultrasonic horn 11 and heater table combination Annville 12, as shown in Arrow v Giving supersonic oscillation (63.5kHz, 2W), as shown in Arrow P By the load pressure (0.1-0.3Kgf), by pressing the bump 9 of a bare chip 8 against thermoplastic-resin-adhesive (thermoplastics coat) 4a in a heating melting state, fused thermoplastics coat 4a is pushed away and a bump 9 and the electrode field 10 are contacted.

[0052] At the ultrasonic-jointing process shown in this drawing (c), by giving supersonic oscillation v continuously further, diffused junction between metals is advanced and ultrasonic jointing of a bump 9 and the electrode field 10 is carried out.

[0053] Again, it returns to drawing 1 and explanation is continued.

[Adhesion process (E)] At this process, by removing 150-degree C heating given to the wiring substrate, fused thermoplastics coat 4a is re-stiffened with natural air cooling or forced cooling, and between semiconductor bare chip 8 main part and circuit patterns 6 is pasted up. That is, cooling solidification of the thermoplastics coat 4a in the melting state fulfilled between the base of the semiconductor bare chip 8 and the wiring substrate 7 is carried out, and adhesion fixation of the semiconductor bare chip 8 and the wiring substrate 7 is carried out firmly.
[0054] The mounting structure completed through above process (A) - (E) is shown in drawing 3 . Since junction to the (1) bump 9 and the electrode field 10 is the diffused junction by the ultrasonic wave according to this mounting structure as shown in this drawing, Since the resin seal of the joint of that a positive electric flow can be aimed at, and the (2) bump 9 and the electrode field 10 is carried out, In case a bird clapper, and the (3) semiconductor chip 8 and the wiring substrate 7 are it hardening of thermoplastics coat 4a that moisture resistance is good, in order to paste up, (4) electric flow and mechanical combination can be made [that the mechanical mounting intensity to hauling etc. is high,] simultaneously in a short time, (5) -- since a thermoplastics coat does not exist about the portion which special closure or a special adhesion process, and the charge of a binder having an alike and low unnecessary hatchet manufacturing cost and (6) substrate front face have exposed, the operation effects, like there is no substrate front face at the time of heating, and there is no poor ****** more than required are acquired
[0055] The bonding strength between the semiconductor bare chips 8 and circuit patterns 6 in the case of the mounting method using the resin coat of this operation form is shown in drawing 4 as compared with it at the time of using only ultrasonic jointing. In the case of this invention mounting method, as compared with the case of only ultrasonic jointing, the 2 to 3 times' as many powerful bonding strength as this was obtained so that clearly from this drawing. This cannot be overemphasized by that it is for pasting up in case a semiconductor chip 8 and the wiring substrate 7 are hardening of thermoplastics coat 4a.
[0056] In addition, although the PET film 2 was used with the above-mentioned operation form as a resin base material which constitutes plywood 1, a polyimide film etc. can also be used instead of a PET film.
[0057] Moreover, as the quality of the material of the etching-resist pattern 4, the thermoplastics of a polyester system can also be used instead of a polyolefine system resin. However, in that case, FeCl2 of an acid system will be used as an etching reagent.
[0058] Moreover, the front face of a circuit pattern 6 continues all over the, is being worn by thermoplastics coat 4a, and can generalize the wiring substrate 7 shown in drawing 1 (C) as a wiring substrate for flip chip bonding.
[0059] And since according to such composition the front face of a circuit pattern 6 continues all over the and is being worn by thermoplastics coat 4a when it is used for the above-mentioned mounting method, damp-proof good closure structure and a bonded structure with high tensile strength are obtained. That is, while thermoplastics coat 4a located near [on a circuit pattern 6 / electrode field 10] contributes mainly to a closure operation of the ultrasonic-jointing section, thermoplastics coat 4a located in portions other than an electrode field contributes to an adhesion operation with semiconductor chip 8 main part and the wiring substrate 7.
[0060] Moreover, the manufacture method of the wiring substrate shown in drawing 1 (B) and (C) can use thermoplastics as etching mask material used in case a circuit pattern will be formed by etching processing, if it puts in another way, and can generalize it as the manufacture method of the wiring substrate for flip chip bonding.
[0061] And since the etching mask material used for the etching processing for formation of a circuit pattern serves as a wrap thermoplastics coat in the whole surface on the front face of a conductor pattern as it is according to such composition, separately, a coat formation process is unnecessary, and time and effort is not taken, but it can manufacture to a low cost.
[0062] Finally, the operation effect of the mounting method of the semiconductor chip concerning this operation form is described collectively. That is, it is not necessary to exfoliate at another process, and, according to the above mounting method,-izing of the insulating resist used by etching processing can be carried out [low cost] in the formation process of (1) circuit

pattern.
[0063] (2) Further, the insulating resist which consists of thermoplastics works as adhesives directly under a semiconductor chip, and can reinforce the mounting intensity of the semiconductor by the ultrasonic wave.
[0064] (3) Moreover, the bump circumference can be closed by resin material and the humidity-tolerant reliability of a bump connection can be improved.
[0065] (4) The resin material with the above-mentioned purpose needed by the conventional method is unnecessary, and the fall of material cost can be aimed at.
[0066] (5) The positive connection between terminals is obtained by the diffused junction of the metal between the bump by supersonic oscillation, and a circuit pattern.
[0067] (6) Ultrasonic jointing, melting of thermoplastics, and hardening can be performed within in 1 - 2 seconds, and can aim at shortening of production time.
[0068] Next, 1 operation form of the manufacture method of the data carrier concerning this invention is explained, referring to drawing 5 - drawing 10 . In addition, electromagnetic wave reading which functions as an aeronautical-navigation tag, the label for physical distribution managements, a path for an uninhabited ticket gate, etc. is possible for this data carrier. and the data carrier main part with which this data carrier makes it come to hold the metallic foil pattern which constitutes an antenna coil in the base made of a film-like resin and the aluminum foil circuit pattern of the base front face made of a film-like resin -- a transceiver circuit -- making a note -- etc. -- the electronic-parts module which comes to mount the semiconductor bare chip to constitute is unified, and it is constituted
[0069] An example of the operation form of a data carrier is shown in drawing 5 . As shown in this drawing, this data carrier DC has the data carrier main part 100 which makes it come to hold the swirl-like conductor pattern 102 made from copper foil of 10-micrometer ** (equivalent to an antenna coil) on one side of the base 101 made from PET (polyethylene terephthalate) of 25-micrometer **, and the electronic-parts module 200 which comes to mount a bare chip IC 202 in the wafer 201 made from glass epoxy of 70-micrometer ** at an undersurface side drawing. and the circumference whose wafer 201 of the, as for the electronic-parts module 200, constitutes the spiral conductor pattern 102 -- a conductor -- bunch 102a is straddled (it crosses, if it puts in another way) -- it is made like, and is carried on the data carrier main part 100, and electrical installation with the spiral conductor pattern 102 is performed in the inner circumference side edge child pad 103 of the spiral conductor pattern 102, and the periphery side edge child pad 104

[0070] An example of the mounting structure of the electronic-parts module 200 is shown in the expanded sectional view of drawing 6 . The manufacture method of the data carrier main part 100 shown in drawing 5 and drawing 6 and the electronic-parts module 200 is explained one by one below at a detail.
[0071] An example of the manufacturing process of the spiral conductor pattern 102 which constitutes an antenna coil is shown in drawing 7 . The process at the time of forming the spiral conductor pattern 102 which serves as an antenna coil at one side of the base 101 made from a PET film with reference to this drawing is explained.
[0072] ((A) Process) The Cu-PET laminating base material 301 is prepared first. The copper foil 303 of 10-micrometer ** is put on one side of the PET film 302 of 25-micrometer ** through urethane system adhesives as an example, and laminating adhesion of this is carried out through a heat lamination on condition that 150 degrees C and pressure 5 kg/cm2. Thereby, the Cu-PET plywood 301 which copper foil 303 pasted up on the front face of the PET film 302 is completed.
[0073] ((B) Process) Next, the spiral-type-like etching-resist pattern 304 is formed on the front face of the copper foil 303 of the Cu-PET plywood 301. That is, in the shape of [with the number of turns which obtains L value required as a property of a coil, and Q value, line breadth, a pitch, and an inside-and-outside periphery] a spiral type, offset printing is used and insulating etching-resist ink is printed on copper foil 303. As resist ink at this time, the thing of the type hardened by heat or the activity energy line is used. Ultraviolet rays or an electron ray is used as an activity energy line, and in using ultraviolet rays, it uses it, putting a photopolymerization agent into resist ink.

[0074] ((C) Process) Next, the conductive etching-resist patterns 305a and 305b (103,104 of drawing 5) of a required electrode configuration are formed in the position which makes electric flow connection with the electrode of the electronic-parts module 200 on the front face of the copper foil 303 of the Cu-PET plywood 301 in conductive ink. Formation of these resist patterns 305a and 305b is performed in the same offset printing as the aforementioned process, and the thermosetting electric conduction adhesives hardened with 120 degrees C and heat treatment for about 20 minutes are used as resist ink. In addition, printing of the conductive ink in this process may use the thing which could use the screen printing generally enforced and put the photopolymerization agent into for example, Ag particle and the mixture of a thermoplastic adhesive as ink material, or a pewter paste.
[0075] ((D) Process) Next, the copper foil portion 306 exposed from the etching-resist patterns 304,305a and 305b is removed by performing well-known etching conventionally, and the spiral conductor pattern (102 in drawing 5) used as an antenna coil is formed. On the occasion of this etching processing, copper foil 303 is removed on 50-degree C conditions as an etching reagent using FeCl2 (120 g/l). then, although can boil electronic parts and they cannot be mounted on a circuit, i.e., the spiral pattern which constitutes an antenna coil, unless it removes the etching resist generally formed in the aforementioned process B, as the previous process C explained in this invention, there are conductive resist patterns 305a and 305b, and it is not necessary to remove an etching resist by mounting electronic parts in this position Namely, the exfoliation process of an etching resist can be skipped by this invention, and it is effective in the etching resist 304 further formed in insulating ink functioning also as an insulating protective layer of the circuit pattern front face made from copper foil.
[0076] ((E) Process) Press working of sheet metal of the bore 307 which can finally insert the heights (potting section 411) of the electronic-parts module later mentioned in this operation form is carried out. The data carrier main part 100 with which the spiral conductor pattern 308 (102) which becomes one side of the base 302 (101) made from a PET film with an antenna coil by the above was held is completed.
[0077] Next, an example of the creation process of the electronic-parts module 200 is shown in drawing 8 . In addition, the contents shown in drawing 8 are the same as the contents previously explained with reference to drawing 1 except for carrying out the resin seal of the bare chip 408 by potting 411, and arranging the conductive resist 412 to the electrode section for connection with the data carrier main part 100 by the final process.
[0078] [Metallic foil plywood manufacturing process (A)] At this process, the aluminum-PET plywood 401 which makes the field material of a film-like wiring substrate is manufactured. This aluminum-PET plywood 401 puts the hard aluminum foil 403 of 35-micrometer ** on one side (drawing upper surface) of the PET film 402 of 25-micrometer ** through urethane system adhesives, and is manufactured through the process which carries out laminating adhesion of this through a heat lamination on condition that 2 150 degrees C and the pressure of 5kg/cm.
[0079] [Etching mask presswork (B)] At this process, the etching-resist pattern 404 of a necessary circuit pattern configuration is formed in the front face of the hard aluminum foil 403 of the aluminum-PET plywood 401. Formation of this resist pattern 404 is performed by applying to the front face of the hard aluminum foil 403 the adhesives made of thermoplastics of a polyolefine system fused at the temperature of about 150 degrees C about 4-6 micrometers in thickness by methods, such as gravure. As for this coating thickness, it is desirable to adjust according to the bump size or the configuration of the bare chip carried. In addition, at this process, the conductive etching-resist patterns 412a and 412b of a necessary electrode pattern configuration are arranged to a part for a connection with the terminal pad portions 305a and 305b of the data carrier main part 100. Formation of these resist patterns 305a and 305b is performed in the same offset printing as the aforementioned process, and the thermosetting electric conduction adhesives hardened with 120 degrees C and h at treatment for about 20 minutes are used as resist ink. In addition, printing of the conductive ink in this process may use the thing which could use the screen printing generally enforced and put the photopolymerization agent into for example, Ag particle and the mixture of a thermoplastic adhesive as ink material, or a pewter paste.

[0080] [Etching process (C)] At this process, the circuit pattern 406 which consists of hard aluminum foil 403 is formed by removing conventionally the aluminum foil portion 405 exposed from the etching-resist pattern 404 by well-known etching processing. Formation of this circuit pattern 406 is performed by exposing the aluminum foil portion 405 exposed from the etching-resist pattern 4 on conditions with a temperature of 50 degrees C to NaOH (120 g/l) which is an etching reagent. In the front face of the wiring substrate 407 obtained at this etching process, the circuit pattern 406 which consists of hard aluminum foil 403 appears. Moreover, the front face of this circuit pattern 406 is being worn by the adhesives made of thermoplastics of the polyolefine system which continued all over the and was used as an etching-resist pattern (etching mask) 404. If it puts in another way, even if there are few these circuit patterns 406, the front face of an electrode field (connection schedule field with the bump of the semiconductor bare chip mentioned later) is being worn by thermoplastics coat 404a.
[0081] [Ultrasonic mounting process (D)] At this process, the semiconductor bare chip 408 is mounted on the wiring substrate 407, giving an ultrasonic wave. In the state where this process carried out heating melting of the wrap thermoplastics coat 404a for the electrode field 410 on a circuit pattern 406 By pushing giving an ultrasonic wave, the bump 409 of the semiconductor bare chip 408 on thermoplastics coat 404a in the melting state In the state where the process (the 1st process) at which fused thermoplastics coat 404a is pushed away and a bump 409 and the electrode field 410 are contacted, and a bump 409 and the electrode field 410 contacted By giving an ultrasonic wave continuously, the process (the 2nd process) to which ultrasonic jointing of a bump 409 and the electrode field 410 is carried out is included.
[0082] That is, the semiconductor bare chip 408 is 150 micrometers in thickness, and consists of the base as the so-called surface mount die parts which made the bump 409 who is a metal terminal for connection project. At the 1st process, this bump (for example, it consists of gold) 409 is in the state which added supersonic oscillation, and is pressed against thermoplastics coat 404a fused by 150-degree C heating. Then, it is pushed away by fused thermoplastics coat 404a from a bump's 409 nose-of-cam position by a bump's 409 supersonic oscillation, it is removed, and the oxide layer on aluminum foil circuit pattern 406 front face etc. is further removed mechanically by vibration. Consequently, a bump 409 and the electrode field 410 are contacted. At the 2nd process, after that, a bump 409 and the electrode field 410 of a circuit pattern 406 are further heated with the frictional heat by vibration, the metal weld section which the golden atom diffused in aluminum foil is formed, and both ultrasonic jointing is completed.
[0083] After the 1st of a more than and the 2nd process arrange the semiconductor bare chip 8 in a predetermined position, they are completed under 0.2kg [/mm] load-pressure 2 by adding supersonic oscillation with a vibration frequency of 63kHz about several seconds.
[0084] [Adhesion process (E)] At this process, by removing 150-degree C heating given to the wiring substrate, fused thermoplastics coat 404a is re-stiffened with natural air cooling or forced cooling, and between semiconductor bare chip 408 main part and circuit patterns 406 is pasted up. That is, cooling solidification of the thermoplastics coat 404a in the melting state fulfilled between the base of the semiconductor bare chip 408 and the wiring substrate 407 is carried out, and adhesion fixation of the semiconductor bare chip 408 and the wiring substrate 407 is carried out firmly. The appropriate back, the resin seal of the semiconductor bare chip 408 is carried out by well-known technique if needed, and the potting section 411 is formed.
[0085] next, the circumference whose insulating wafer 201 of the constitutes the spiral conductor pattern 102 for the electronic-parts module 200 -- a conductor -- as bunch 102a is straddled, it carries on the data carrier main part 100, and the procedure of separating into an inner circumference [of the spiral conductor pattern 102] and periphery side, and performing electrical installation with a spiral conductor pattern separately is explained with reference to drawing 9
[0086] ((A) Process) the circumference whose electronic-parts module 200 make it the electronic-parts loading side of the electronic-parts module 200 and the electric conduction pattern formation side of the data carrier main part 100 counter, and constitutes the spiral conductor pattern 102 first -- a conductor -- bunch 102a is straddled (it crosses, if it puts in another way) -- it is made like and the electronic-parts module 200 is carried on the data carrier

main part 100 At this time, the wrap potting section 411 is accepted in the hole 307 which was able to be opened in the data carrier main part 100 side in the bare chip 408 which is electronic parts. Furthermore, the conductive resist fields 412a and 412b used as the electrode field of the aluminum foil field 406,406 of a couple through which it flows to the bump 409,409 of a bare chip 408 in the electronic-parts module 200 side are located in the data carrier main part 100 side right above the conductive resist patterns 305a and 305b of a couple. That is, the copper foil field 406,406 by the side of the electronic-parts module 200 and the conductive resist patterns 305a and 305b by the side of the data carrier main part 100 will carry out phase confrontation through the conductive resist field 412,412.

[0087] ((B) Process) Next, the indenters 501a and 501b heated at the temperature of 160 degrees C are especially pressed against the right above [the conductive resist patterns 305a and 305b of a couple] section for [from the electronic-parts module 200] 20 seconds 21.7kg of load pressures, and time. At this time, the conductive resist pattern which is a thermoplastic-adhesive coat carries out softening fusion locally, and adhesion fixation of the conductive resist fields 412a and 412b through which it flows to the terminal area 406,406 of the electronic-parts module 200, and the conductive resist patterns 305a and 305b by the side of the data carrier main part 100 is carried out. On the other hand, since the thermoplastics coat 404a portion was applicable to junction on the electronic-parts module 200 and the data carrier main part 100, with the insulation maintained and the etching resist 304 of the front face of the spiral conductor pattern 102 remains as an insulating material further, the circuit pattern (not shown) on the insulating base-material wafer 402 (201) of the electronic-parts module 200 will serve as the jumper member which connects the inside-and-outside periphery of the spiral conductor pattern 102. Consequently, it becomes possible [the electrical installation of the spiral conductor pattern 102 and a bare chip 408] also for ** without a jumper member, a backwiring pattern, etc. like structure before.

[0088] Next, other 1 operation forms of the manufacture method of the data carrier concerning this invention are explained, referring to drawing 10 - drawing 12 . In addition, electromagnetic wave reading which functions as an aeronautical-navigation tag, the label for physical distribution managements, a path for an uninhabited ticket gate, etc. is possible also for this data carrier. and the data carrier main part which makes it come like the example of the following which also explained this data carrier with reference to ** and drawing 5 to hold the metallic foil pattern which constitutes an antenna coil in the base made of a film-like resin and the aluminum foil circuit pattern of the base front face made of a film-like resin -- a transceiver circuit -- making a note -- etc. -- the electronic-parts module which comes to mount the semiconductor bare chip to constitute is unified, and it is constituted

[0089] An example of the manufacturing process of the spiral conductor pattern 102 (drawing 5) which constitutes an antenna coil is shown in drawing 10 . The process at the time of forming the spiral conductor pattern 102 (drawing 5) which serves as an antenna coil at one side of the base 101 (drawing 5) made from a PET film with reference to this drawing is explained.

[0090] ((A) Process) The Cu-PET laminating base material 1 is prepared first. The copper foil of 10-micrometer ** is put on one side of the PET film of 25-micrometer ** through urethane system adhesives as an example, and laminating adhesion of this is carried out through a heat lamination on condition that 150 degrees C and pressure 5 kg/cm2. Thereby, the Cu-PET plywood 601 with which copper foil 603 was put on the front face of the PET film 602 (101) is completed.

[0091] ((B) Process) Next, the etching-resist pattern 604 of the shape of a spiral type and a terminal area configuration is formed in the front face of the copper foil 603 of the Cu-PET plywood 601. That is, in the shape of [with the number of turns which obtains L value required as a property of a coil, and Q value, line breadth, a pitch, and an inside-and-outside periphery] a spiral type, offset printing is used and insulating etching-resist ink is printed on Cu foil. As resist ink at this time, the thing of the type hardened by heat or the activity energy line is used. Ultraviolet rays or an electron ray is used as an activity energy line, and in using ultraviolet rays, it uses it, putting a photopolymerization agent into resist ink.

[0092] ((C) Process) terminal pad 606a of the spiral conductor pattern 605 which constitutes an

antenna coil by removing conventionally Cu foil partial 603a exposed from the etching-resist pattern 604 formed of the above-mentioned process by the well-known etching method, and an inside-and-outside periphery -- 606b formation of is done On the occasion of this etching processing, FeCl2 (120 g/l) is used on 50-degree C conditions as an etching reagent, and a required copper foil portion (Cu) is removed.
[0093] Since the etching resist located in the junction schedule parts 606a and 606b in this invention is removed by the mechanical friction by the ultrasonic wave in the case of the junction mentioned later, it becomes unnecessary then, to remove the insulating resist 604, although electronic parts cannot be mounted in a circuit top, i.e., a coil, unless it removes the insulating etching resist 604 generally formed in the aforementioned process (B). That is, according to this invention, the exfoliation process of an etching resist 604 can be skipped and the effect that an etching resist 604 can use it as an insulating protective layer of copper conductor pattern 605 front face further is acquired.
[0094] Next, an example of the creation process of the electronic-parts module 200 is shown in drawing 11 .
[0095] [Metallic foil plywood manufacturing process (A)] At this process, the aluminum-PET plywood 701 which makes the field material of a film-like wiring substrate is manufactured. This aluminum-PET plywood 701 puts the hard aluminum foil 703 of 35-micrometer ** on one side (drawing upper surface) of the PET film 702 of 25-micrometer ** through urethane system adhesives, and is manufactured through the process which carries out laminating adhesion of this through a heat lamination on condition that 2 150 degrees C and the pressure of 5kg/cm.
[0096] [Etching mask presswork (B)] At this process, the etching-resist pattern 704 of a necessary circuit pattern configuration is formed in the front face of the hard aluminum foil 703 of the aluminum-PET plywood 701. Formation of this resist pattern 704 is performed by applying to the front face of the hard aluminum foil 703 the adhesives made of thermoplastics of a polyolefine system fused at the temperature of about 150 degrees C about 4-6 micrometers in thickness by methods, such as gravure. As for this coating thickness, it is desirable to adjust according to the bump size or the configuration of the bare chip carried.
[0097] [Etching process (C)] At this process, the circuit pattern 706 which consists of hard aluminum foil 703 is formed by removing conventionally the aluminum foil portion 705 exposed from the etching-resist pattern 704 by well-known etching processing. Formation of this circuit pattern 706 is performed by exposing the aluminum foil portion 705 exposed from the etching-resist pattern 704 on conditions with a temperature of 50 degrees C to NaOH (120 g/l) which is an etching reagent. In the front face of the wiring substrate 707 obtained at this etching process, the circuit pattern 706 which consists of hard aluminum foil 703 appears. Moreover, the front face of this circuit pattern 706 is being worn by the adhesives made of thermoplastics of the polyolefine system which continued all over the and was used as an etching-resist pattern (etching mask) 704. If it puts in another way, even if there are few these circuit patterns 706, the front face of an electrode field (connection schedule field with the bump of the semiconductor bare chip mentioned later) is being worn by thermoplastics coat 704a.
[0098] [Ultrasonic mounting process (D)] At this process, the semiconductor bare chip 708 is mounted on the wiring substrate 707, giving an ultrasonic wave. In the state where this process carried out heating melting of the wrap thermoplastics coat 704a for the electrode field 710 on a circuit pattern 706 By pushing giving an ultrasonic wave, the bump 709 of the semiconductor bare chip 708 on thermoplastics coat 704a in the melting state In the state where the process (the 1st process) at which fused thermoplastics coat 704a is pushed away and a bump 709 and the electrode field 710 are contacted, and a bump 709 and the electrode field 710 contacted By giving an ultrasonic wave continuously, the process (the 2nd process) to which ultrasonic jointing of a bump 709 and the electrode field 710 is carried out is included.
[0099] That is, the semiconductor bare chip 708 is 150 micrometers in thickness, and consists of the base as the so-called surface mount die parts which made the bump 709 who is a metal terminal for connection project. At the 1st process, this bump (for example, it consists of gold) 709 is in the state which added supersonic oscillation, and is pressed against thermoplastics coat 704a fused by 150-degree C heating. Then, it is pushed away by fused thermoplastics coat 704a

from a bump's 709 nose-of-cam position by a bump's 709 supersonic oscillation, it is removed, and the oxide layer on aluminum foil circuit pattern 706 front face etc. is further removed mechanically by vibration. Consequently, a bump 709 and the electrode field 710 are contacted. At the 2nd process, after that, a bump 709 and the electrode field 710 of a circuit pattern 706 are further heated with the frictional heat by vibration, the metal weld section which the golden atom diffused in aluminum foil is formed, and both ultrasonic jointing is completed.
[0100] After the 1st of a more than and the 2nd process arrange the semiconductor bare chip 8 in a predetermined position, they are completed under 0.2kg [/mm] load-pressure 2 by adding supersonic oscillation with a vibration frequency of 63kHz about several seconds.
[0101] [Adhesion process (E)] At this process, by removing 150-degree C heating given to the wiring substrate, fused thermoplastics coat 704a is re-stiffened with natural air cooling or forced cooling, and between semiconductor bare chip 708 main part and circuit patterns 706 is pasted up. That is, cooling solidification of the thermoplastics coat 704a in the melting state fulfilled between the base of the semiconductor bare chip 708 and the wiring substrate 707 is carried out, and adhesion fixation of the semiconductor bare chip 708 and the wiring substrate 707 is carried out firmly. The appropriate back, the resin seal of the semiconductor bare chip 708 is carried out by well-known technique if needed, and the potting section 711 is formed. Above, the electronic-parts module 707 is completed.
[0102] Next, the process which mounts the electronic-parts module 707 on a data carrier 607, and is electrically connected with an antenna coil is explained according to drawing 12 . This process is performed using ultrasonic welding technology.
[0103] ((A) Process) The electronic-parts module 707 is first carried on the data carrier main part 607 in the state of the adjustment which the terminal pads 606a and 606b which are the junction schedule parts 708a and 708b by the side of electronic parts and a junction schedule part by the side of a data carrier main part face.
[0104] ((B) Process) Subsequently to one, the indenter 801,802 of the descending couple is pressed a time T (for 0.5 seconds) grade, adding the supersonic oscillation of a load pressure P (0.2kg/mm2) and vibration frequency V (40kHz) to the right above section of the junction schedule parts 708a and 708b of the electronic-parts module 707. In addition, 803,804 is Annville by which opposite arrangement was carried out with indenters 9 and 10.
[0105] Generally, with welding, an atom is made to approach distance (several angstroms) which attraction commits mutually between [atomic] the front faces of the metal which it is going to combine, and it is generated by taking an array with the atom of the whole field orderly moreover, and contacting. However, usually, since the metaled front face is being worn by thin surface layers, such as an oxide and adsorption gas, approach of the pure metal atom of the ground is barred, and it does not produce sufficient bonding strength.
[0106] Then, by this ultrasonic-jointing method, adhesion fixation of the terminal of an electronic-parts module and the terminal by the side of an antenna coil is carried out by removing a surface-of-metal layer, making atomic vibration prosperous further, and diffusing an atom by the supersonic oscillation by method which was described above.
[0107] Furthermore, as described above, while this method has not exfoliated the insulating etching resist 704 formed on terminal pad 606a of a conductor pattern, and 606b of the process (B) of drawing 12 based on the principle which removes a metaled surface layer by supersonic oscillation, and realizes junction, even if it carries out this junction process, a mechanical junction property is acquired by electric list sufficient between the electronic-parts module 707 side and the data carrier main part 607 side. The film-like data carrier DC (refer to drawing 5) which starts this invention according to the above process is completed.
[0108] In addition, while preparing the irregularity of a large number corresponding to a weld section configuration in an indenter 801,802 and the end face of Annville 803,804 which counters, corresponding to a projected part, a metaled plastic flow can be produced locally, and the resin layers faced from the portion from which the metal layer was removed can be made to weld by supersonic oscillation by adjusting the press time of an indenter 801,802 in the operation form explained above. It is effective, when a data carrier is what is easy to receive the rough treatment of an aeronautical-navigation tag, the label for physical distribution managements, etc.,

since the mechanical bond strength of an electronic-parts module improves markedly in using together such metal weld and resin weld especially.
[0109] In this way, since electromagnetic field are used for it as a reading medium, the completed film-like data carrier does not receive so much the restrictions [be / directional / distance-/ it] which face reading, and specifically, it can read in 100-1000mm distance certainly the data memorized in the semiconductor, without receiving restrictions in the directivity of reading.
[0110] The humidity resistance test result (temperature 85degreeC, 85% of humidity) of the film-like data carrier manufactured with this operation form is shown in drawing 13 . As shown in this drawing, change of the communication range after humidity resistance test 250-hour progress is less than **10%, and it was checked that value sufficient as humidity-tolerant reliability for a bump connection is acquired.
[0111]
[Effect of the Invention] By the above explanation, according to this invention, the mounting method of the semiconductor chip according a semiconductor chip also electrically and mechanically to the flip-chip-bonding method which can be mounted in a low cost can be quickly offered certain further on a wiring substrate so that clearly.
[0112] Moreover, according to this invention, the manufacture method of the data carrier in which electromagnetic wave reading which can mass-produce the data carrier which functions as an aeronautical-navigation tag, the label for physical distribution managements, a path for an uninhabited ticket gate, etc., and in which electromagnetic wave reading is possible to a low cost is possible can be offered.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is process drawing explaining this invention mounting method.
[Drawing 2] It is explanatory drawing showing the detail of an ultrasonic mounting process.
[Drawing 3] It is the cross section of the mounting structure by this invention method.
[Drawing 4] It is drawing shown by making the bonding strength of a semiconductor chip and a circuit pattern into a table.
[Drawing 5] It is the front view showing an example of a data carrier.
[Drawing 6] a data carrier main part and electromagnetism -- it is the cross section of the laminating section with a part module
[Drawing 7] It is process drawing showing the manufacturing process of a data carrier main part.
[Drawing 8] It is process drawing showing the manufacturing process of an electronic-parts module.
[Drawing 9] It is process drawing showing the loading process to the data carrier main part of an electronic-parts module.
[Drawing 10] It is drawing showing the manufacturing process of a data carrier main part.
[Drawing 11] It is drawing showing the manufacturing process of an electronic-parts module.
[Drawing 12] It is process drawing showing the loading process to the data carrier main part of an electronic-parts module.
[Drawing 13] It is drawing shown by making into a table the humidity resistance test result of the film-like data carrier to which this invention was applied.
[Drawing 14] It is drawing showing the 1st conventional method of flip chip bonding.
[Drawing 15] It is drawing showing the 2nd conventional method of lip chip connection.
[Description of Notations]
1,401,701 aluminum-PET laminating base material
2,402,702 PET film
3,403,703 Aluminum foil
4,404,704 Etching-resist pattern made of thermoplastics
5,405,705 Portion in which a resist pattern does not exist
6,406,706 Aluminum foil circuit pattern
7,407,707 Wiring substrate
8,408,708 Semiconductor bare chip
9,409,709 Bump
10,410,710 Electrode field on a circuit pattern
11,801,802 Ultrasonic horn
12,803,804 Ultrasonic wave [a heater table-cum-] Annville
DC Data carrier
100 Data Carrier Main Part
101 Base made from PET
102 Spiral Conductor Pattern
102a the circumference -- a conductor -- a bunch
103 Inner Circumference Side Edge Child Pad

104 Periphery Side Edge Child Pad
200 Electronic-Parts Module
201 Insulating Wafer
202 Bare Chip
411,711 Potting section
412 Conductive Resist Field
501a, 501b Indenter

[Translation done.]

* NOTICES *

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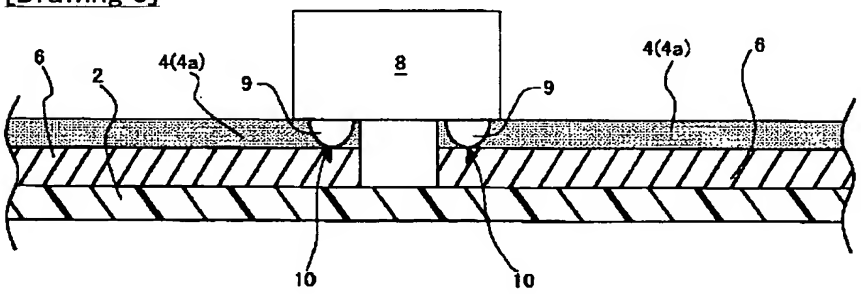
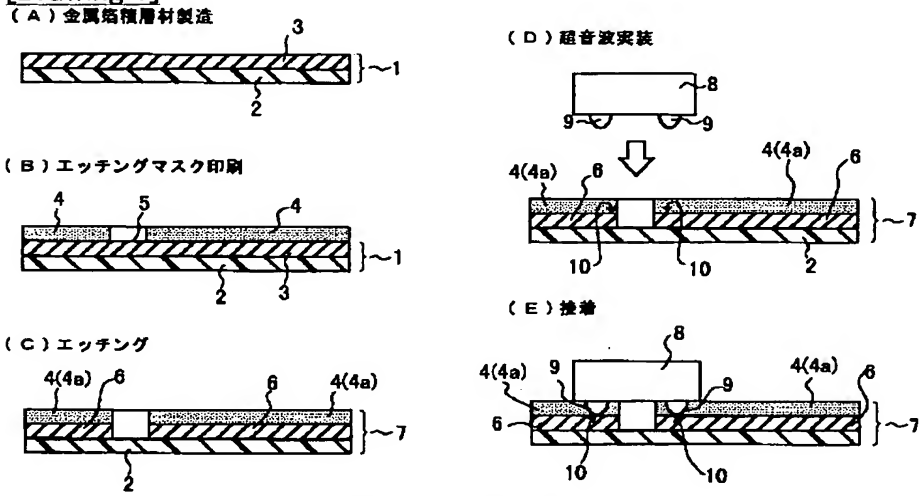
DRAWINGS

[Drawing 3]



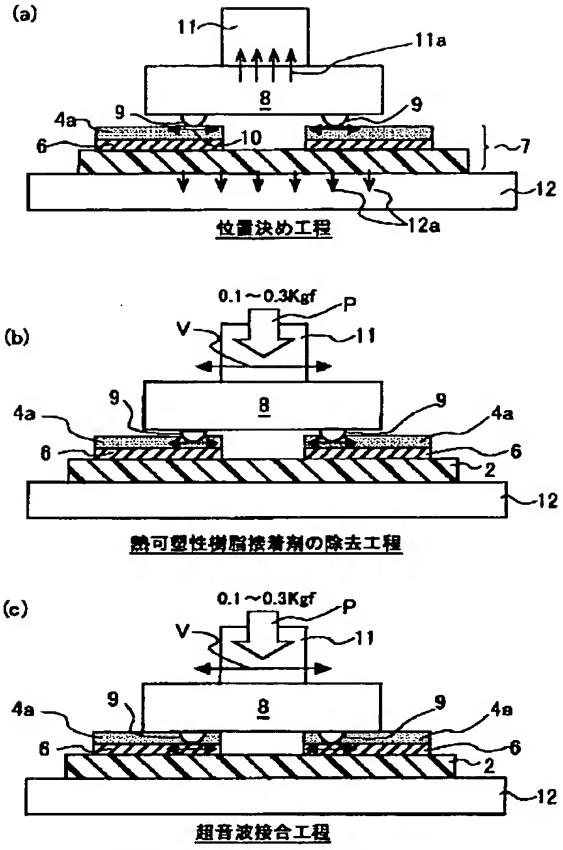
本発明方法による実装構造の断面図

[Drawing 1]



本発明実装方法を説明する工程図

[Drawing 2]



超音波実装工程の詳細を示す説明図

[Drawing 4]

半導体実装方法	4スタッドバンプの超音波接合	実施例1
シェアー強度（g）	200～250	500～800

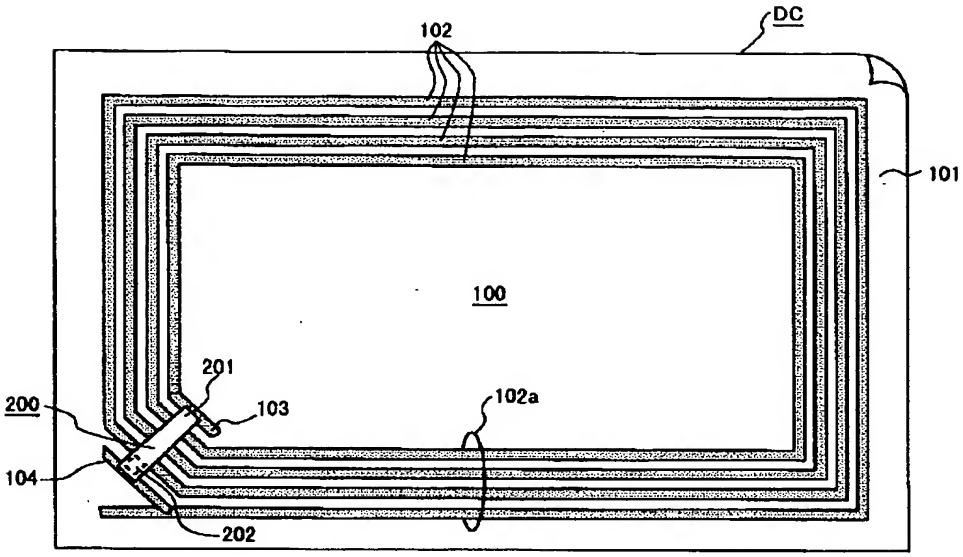
半導体チップと配線パターンとの接合強度を表にして示す図

[Drawing 13]

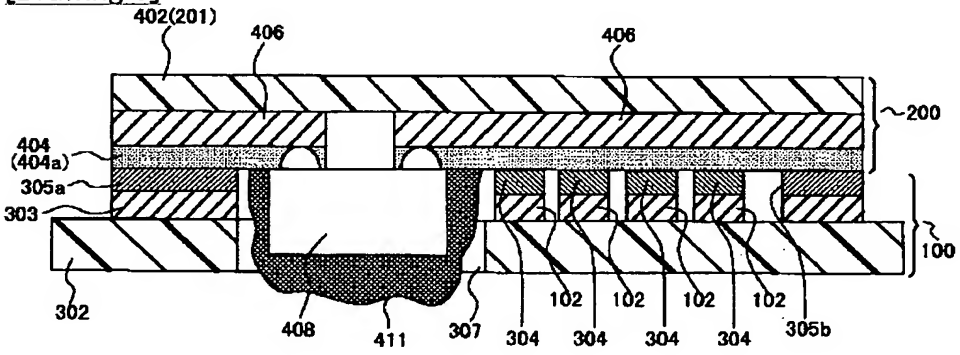
試験経過時間	0 hr	120 hr	250 hr
通信距離（mm）	95	106	101

本発明方法が適用されたフィルム状データキャリアの耐湿試験結果を表示して示す図

[Drawing 5]

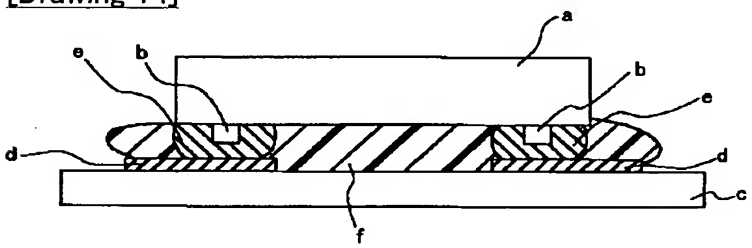


[Drawing 6]



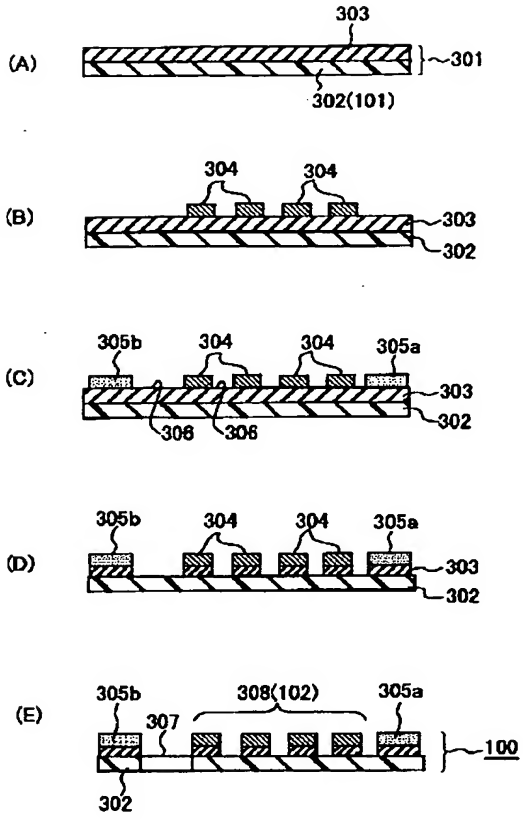
データキャリア上に電子部品モジュールを実装した状態の断面図

[Drawing 14]



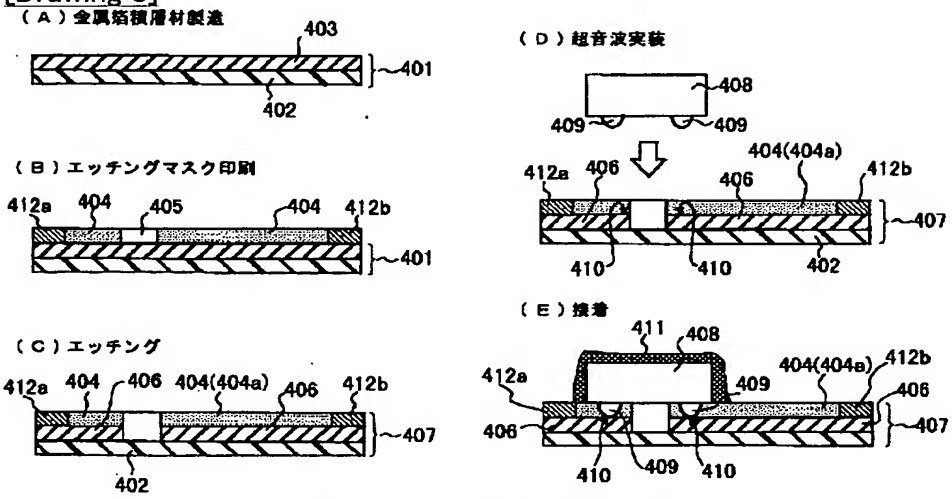
フリップチップ接続の第１従来方式を示す図

[Drawing 7]



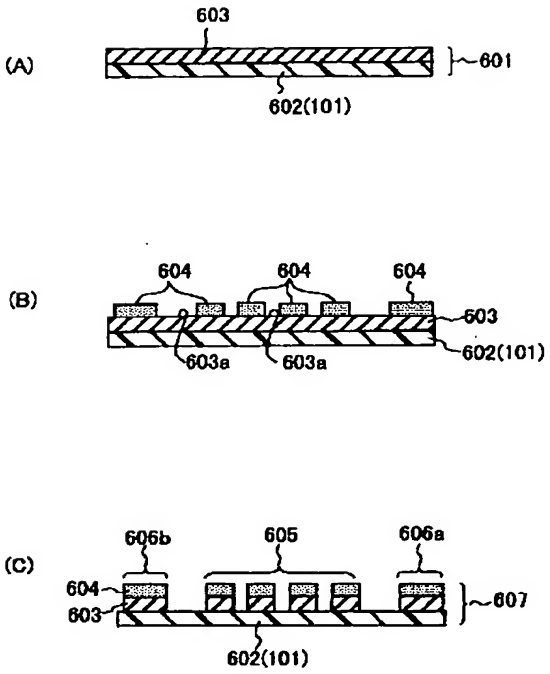
データキャリア本体の製造工程を示す図

[Drawing 8]



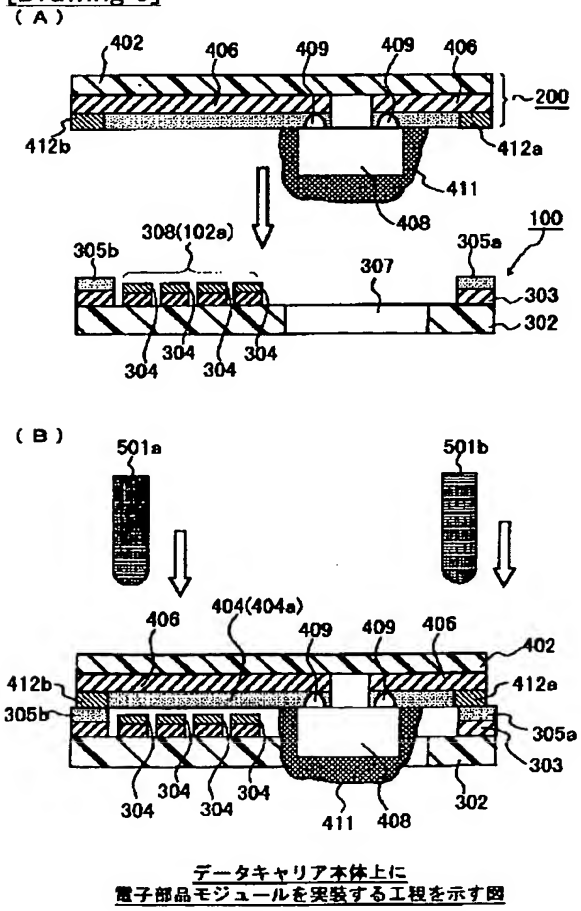
電子部品モジュールの製造工程を示す図

[Drawing 10]



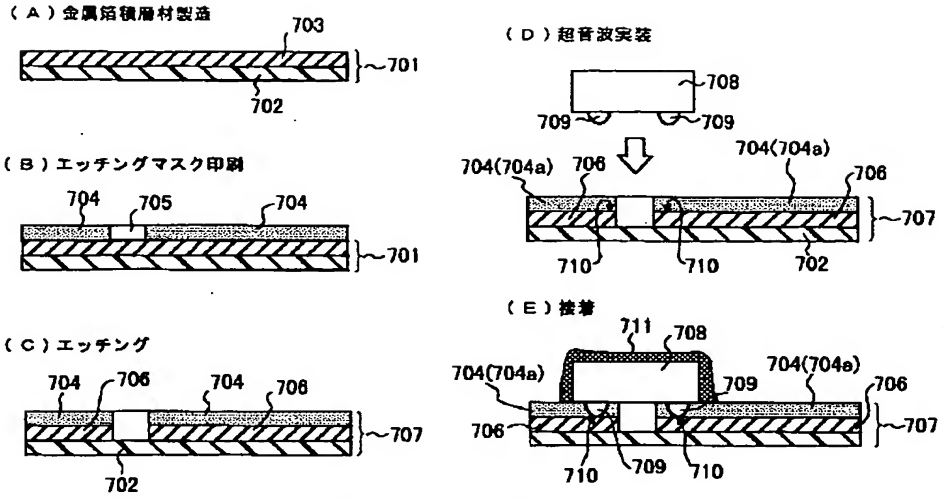
データキャリア本体の製造工程を示す図

[Drawing 9]



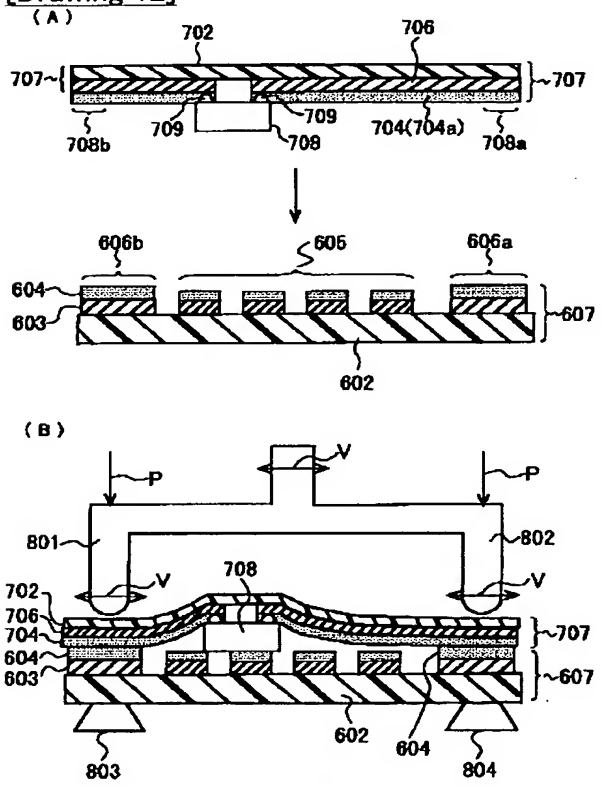
データキャリア本体上に
電子部品モジュールを実装する工程を示す図

[Drawing 11]



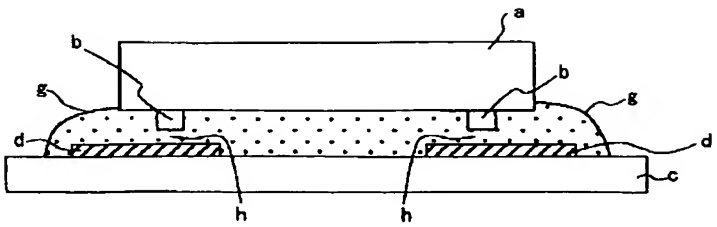
電子部品モジュールの製造工程を示す図

[Drawing 12]



データキャリア本体上に
電子部品モジュールを実装する工程を示す図

[Drawing 15]



フリップチップ接続の第２従来方式を示す図

[Translation done.]